

## Saving the World by Teaching Behavior Analysis: A Behavioral Systems Approach

Richard W. Malott, Pamela L. Vunovich,  
William Boettcher, and Corina Groeger  
Western Michigan University

This article presents a behavioral systems approach to organizational design and applies that approach to the teaching of behavior analysis. This systems approach consists of three components: goal-directed systems design, behavioral systems engineering, and performance management. This systems approach is applied to the Education Board and Teaching Behavior Analysis Special Interest Group of the Association for Behavior Analysis, with a conclusion that we need to emphasize the recruitment of students and the placement and maintenance of alumni. This systems approach is also applied at the scale of the individual faculty member running a university-based training system and is seen to generate special approaches to textbook preparation, undergraduate research, colloquium and conference attendance, career counseling, preparation for graduate examinations, graduate training and graduate seminars, and classroom alternatives to the traditional lecture.

*Key words:* college teaching, behavior analysis training, behavioral systems analysis

Behavior analysis can solve most human problems, at the individual level, organizational level, societal level, and perhaps even the global level. But instead, we are working mainly at the promissory level. A major reason for our minimal contribution is that there are too many problems and too few behavior analysts to solve them. So, if we are to save the world with behavior analysis, if we are to work effectively toward improving the well-being of humanity, we need many more well-trained, well-employed behavior analysts. This article describes a system-

atic vision of how to save the world and our attempts to implement that vision—our efforts to think globally and act locally.

### MODELS FOR THE SYSTEMATIC VISION

In doing behavioral systems analysis, we use three general models: the *goal-directed systems design* model (to help in the overall structuring of our systems), the *systems engineering* model (to guide the development of a successful system), and the *three-contingency model of performance management* (to support optimal human performance within the system). We will illustrate the first two models with examples from the Education Board and the Teaching Behavior Analysis Special Interest Group (TBA SIG) of the Association for Behavior Analysis (ABA). We will illustrate the third model with an example from a behavior analysis course. Then we will look at components of a single-faculty-member university training system to illustrate of the application of these three models.

#### *Goal-Directed Systems Design*

Most systems seem to evolve as a result of historical accident, historical

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When coauthoring a piece of this sort, it is hard to know when to say “I,” “we,” “the first author,” “the second author,” and so on. We find it less intrusive to generally use the first person plural, even when it obviously is not, rather than to self-consciously switch around. (This is the corporate “we,” not the papal “we.”) You may cope with this awkwardness more gracefully if you know that Vunovich worked with the Behavior Systems Analysis Program and Boettcher and Groeger worked with ABA’s Education Board and ABA’s Teaching Behavior Analysis Special Interest Group, while the senior author concentrated on the relevant spiritual issues.

Address correspondence concerning this article, related instructional materials, and ABA’s Education Board and Teaching Behavior Analysis SIG to Richard W. Malott, Department of Psychology, Western Michigan University, Kalamazoo, Michigan 49008.

precedent, and momentary expedience. They show little evidence of systematic attention to an overriding mission and to the careful development of strategies for achieving that mission. (This seems to apply to universities and behavioral training programs as well as any other system.) To correct this general problem, Gilbert (1978) presented a systematic effort (called *levels of vantage*) to view the interrelated, hierarchical functions of components of organizations or systems in terms of levels of vantage, from the philosophical level, through the cultural, policy, strategic, and tactical levels, down to the logistic level. Malott and Garcia (1987) continued in the Gilbert tradition with the development of their goal-directed systems design model. A goal-directed systems design entails the specification of the ultimate goals of a system (e.g., saving the world with behavior analysis), then the specification of the next lower level of subgoals (e.g., employment of well-trained behavior analysts effectively working toward that ultimate goal), then the next lower level of subgoals (e.g., the production of well-trained behavior analysts), moving systematically down to lower and lower subgoals (e.g., the recruitment of qualified students into behavior analysis training programs). Furthermore, an organization can be divided into its three major components: distribution of the output, production of that output, and attainment of the raw materials for that production (Shimamune, 1992; Vunovich, 1995). Because the teaching of behavior analysis occurs within a systems context, such teaching will more readily accomplish worthy long-range goals if it is part of an overall goal-directed design.

Figure 1 shows how goal-directed systems design provides an overall view, using as an illustration the strategic plan for the recently created Education Board of ABA. If an organization is not accomplishing its mission, the systems analyst takes a more molecular look at the subgoals of the organization. Each of those subgoals also

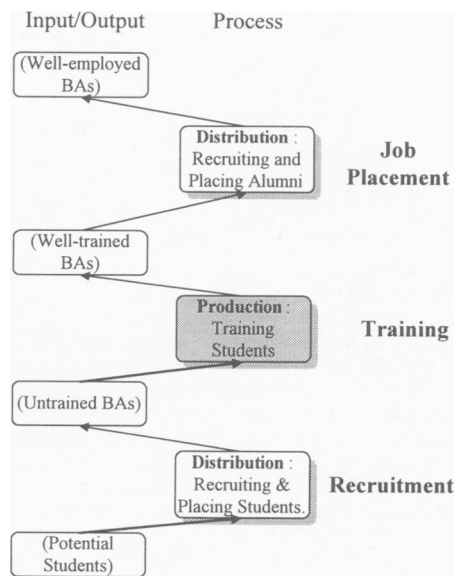


Figure 1. The goal-directed systems design applied to the overview of the Education Board's strategic plan.

involves the three components of output, production, and input (see Figure 2). An evaluation of the accomplishments of each subgoal can then point to those areas that are most in need of improvement.

Perhaps the most important result of this goal-directed systems analysis is the pinpointing of what we consider to be the weakest links in efforts within the field of behavior analysis to improve the well-being of humanity. Our training programs are working well enough, but we do not have enough people to train. Most graduate programs in behavior analysis have many unfilled openings for qualified students. Thus, those training programs are not producing nearly enough graduates to fill the demand, let alone the need, for trained behavior analysts. To compound the problem, a large percentage of our alumni end up working in professional and social verbal communities that do not support a behavioral repertoire; as a result, they drop out of ABA and soon show little evidence of their behavior-analytic training. In other words, ABA's Education

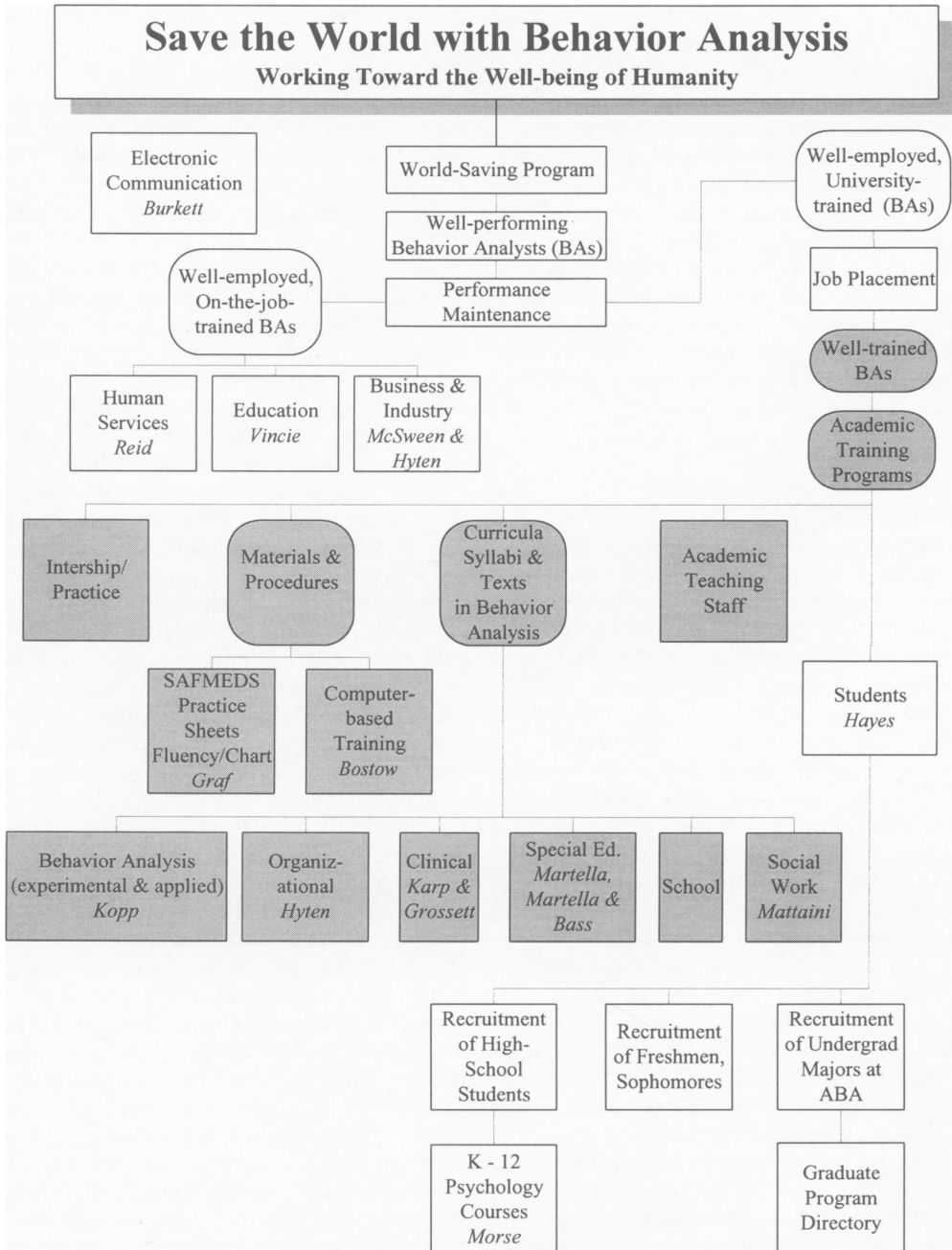


Figure 2. The goal-directed systems design applied to the details of the Education Board's strategic plan. Each rectangle represents a committee (those with names assigned) or a potential committee (those without). (The reader made uncomfortable by the sight of one of those squares without a name can write his or her name in the square and mail us a photocopy.) The figures with the curved corners represent summary goals rather than committees.

Board and TBA SIG, as well as our field in general, need to greatly increase the emphasis on recruitment, placement, and maintenance rather than on training—not on the technology and content of instruction with which we are now most concerned. In Gilbert's terms, our greatest potential for improving performance (PIP) is in the input and output components of our system, not in production. Of course, we can continue to hone production; our efforts should not go to such honing at the expense of our greatest PIPs.

### *Behavioral Systems Engineering*

Systems engineering applied to the design of any system, be it mechanical, electrical, or human, involves six steps (Malott, 1974): (a) *analysis* of the variables that affect the operation of the system, (b) *specification* of the objectives to be accomplished by that system, (c) *design* of the system to accomplish those objectives, (d) *implementation* of that design, (e) *evaluation* of the extent to which the implemented design accomplished the specified objectives, and finally, (f) *recycling* through the previous five steps, because no system of any significance ever accomplishes its objectives in its first several iterations.

To illustrate the ubiquitous importance of behavioral systems engineering, we will first attempt to show its crucial, but overlooked, involvement in two venerable domains of behavior analysis—*Walden Two* and programmed instruction.

In our view, Skinner's utopian novel *Walden Two* (1948) had little to do with behavior analysis and even less to do with the then-nonexistent field of applied behavior analysis. Instead, it was an early example of the application of systems engineering to the design of an organization. *Walden Two* contains many more examples of components of the systems approach (e.g., the food tray) than it does of applied behavior analysis (hanging a lollipop around a child's neck has not become

a frequently replicated technique for teaching self-control).

Similarly, the strength of early programmed instruction lies more in its systems engineering approach than in its tenuous connection to behavior analysis. Programmed instruction involves (a) an analysis of the content of a subject matter and the proper sequencing of that content, (b) a careful specification of the detailed objectives that programmed instruction is to accomplish, (c) the careful design of a sequence of instructional frames, (d) implementation, and, perhaps most important, (e) detailed evaluation of the accomplishment of the objectives and (f) recycling through the preceding steps until a satisfactory percentage of the students accomplish the instructional objectives.

We believe the revolutionary essence of programmed instruction is in this systems engineering approach, not in dubious applications of backward chaining or exaggerated claims about the reinforcing value of getting the correct answer to an obvious question.

To illustrate a systems engineering application to the teaching of behavior analysis, let us look at the development of ABA's Education Board and its TBA SIG. We applied the behavioral engineering model as follows: We did an informal analysis during a morning jog with Steve Graf along Lake Shore Drive in 1992, and suggested that ABA was making little direct contribution to the teaching of behavior analysis, even though most of its full members were actively engaged in that activity. Further analysis suggested that most teachers of behavior analysis were working in isolation, even within behavior-analytic departments, contributing little to each others' efforts. Thus, we specified the vague objective of increasing the use of behavior analysis in the teaching of behavior analysis. Next, we designed a pair of interlocking systems to accomplish this ill-defined goal, the Education Board of the Society for the Advancement of Behavior Analysis (Morris, 1993) (later

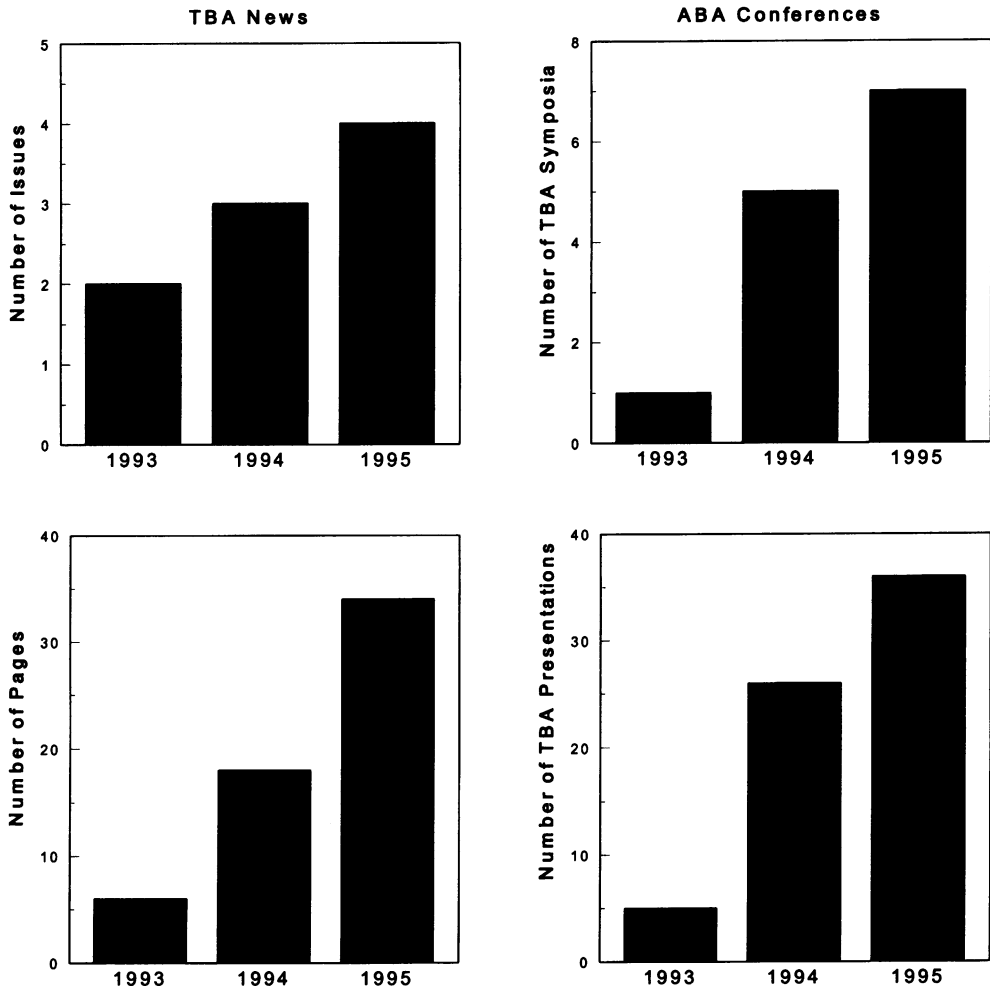


Figure 3. The accomplishments of the TBA SIG (part of the accomplishments for 1995 are extrapolated).

transferred to ABA) and ABA's TBA SIG. Then we implemented these interlocking systems with phone calls, E-mail, calls for papers, the *TBA News*, and symposia and posters at the ABA conferences. We have evaluated our accomplishments in terms of number of newsletter pages, number of symposium presentations, number of paid TBA SIG members, number of Education Board committee chairs, and number of monthly Education Board committee reports. In other words, we are still evaluating mainly at the process level and have not yet gotten to the evaluation of our impact on our

penultimate goal (increasing the effective use of behavior analysis in the teaching of behavior analysis) let alone to the evaluation of our contribution to saving the world (i.e., improving the well-being of humanity) (see Figure 3). But even this early evaluation of our low-level process objectives mandates active involvement in the recycling phase.

It is our view that, although behavioral systems engineering may seem like common sense to behavior analysts and although teachers of behavior analysis may make more use of behavioral systems engineering than the ma-

jority of teachers, in fact most teachers of behavior analysis make little systematic, conscientious effort to use all components of behavioral systems engineering in their instruction and curriculum development, let alone in their recruitment, placement, and maintenance efforts. It is our view that the vigorous adoption of behavioral systems engineering would greatly improve the quality and quantity of behavior analysis teaching and its contribution to the well-being of humanity.

### *The Three-Contingency Model of Performance Management*

What distinguishes behavioral systems analysis from any other systems analysis is not just that it deals with systems of human behavior, but also that a good practitioner is uniquely sensitive to the crucial role the failure of human performance plays in the failure of organizations to accomplish their goals. Furthermore, we are uniquely prepared to design the performance management contingencies needed to improve that lagging human performance.

We have consistently and systematically applied the three-contingency model to ABA's Education Board and TBA SIG, which have been rich with opportunities to improve lagging human performance on the part of the board chair and SIG chairs, the assistant to the chair, and the committee chairs. These applications have had considerable success, but it may be of more interest to illustrate the three-contingency model with examples from a more commonly shared type of system—a course in behavior analysis. We treat each of our courses as systems staffed by the teacher, the assistant, the teaching apprentices, and the students.

*The ineffective natural contingency.* The problem is that, although we all want to contribute our share to saving the world by being effective, hard-working teachers, assistants, apprentices, and students, the natural outcome of doing 1 hr of work is too small to

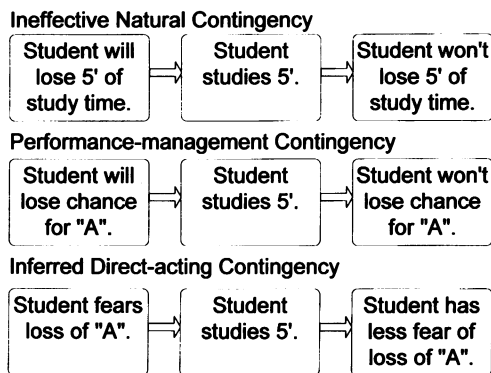


Figure 4. The three-contingency model of performance management applied to studying.

reinforce that noble behavior, even though the cumulative outcome of several hundred hours of such work would be of great significance.

For example, a few minutes of study produces such a slight increment in the student's knowledge, skill, and ability to save the world that such an outcome will not reinforce the studying. Or, in terms of an avoidance paradigm, if the student waits 5 min before starting to study, only 5 min of study time will be lost—no big deal. So the contingency of studying to avoid the loss of that reinforcer also fails to control study behavior. In either case the natural contingency is ineffective, even when the student knows the rule describing that contingency. This illustrates a major cause of poor control by contingencies and rules describing contingencies—the contingency involves an outcome that is too small, although it may be of great cumulative significance. The spirit is willing, but the flesh is weak (see the first diagram in Figure 4). However, ineffective natural contingencies are the *raison d'être* of applied behavior analysis (Jackson & Malott, 1994).

*The effective, indirect-acting performance management contingency.* This brings in the performance management contingency. Contrary to the popular misconception of most professional behavior analysts (Malott, Malott, & Shimamura, 1993), we argue that with verbal human beings, performance

management contingencies almost always involve indirect-acting, rule-governed analogues to the direct-acting contingencies of the Skinner box. Almost always, the outcome is delayed by far more than the few seconds tolerated by a true reinforcement contingency (Malott, Shimamura, & Malott, 1993). And yet, if the behavior states or hears the rule describing a contingency involving a sizable and probable although delayed outcome, that rule statement can control the relevant behavior appropriately.

Frequent deadlines for tasks that require relatively small amounts of behavior are the sworn enemy of procrastination-generated unproductivity. For verbal human beings, we believe these contingencies are not only indirect-acting analogues; they are also analogues to avoidance rather than analogues to reinforcement, contrary to popular belief. The existence of a deadline always seems to generate an avoidance contingency—avoidance of the loss of a reinforcer or loss of the opportunity to obtain a reinforcer, avoidance of an aversive condition, or avoidance of whatever will happen or fail to happen if the deadline is not met.

So an effective supplement to the student's ineffective natural contingency is an analogue to avoidance of a bad grade or avoidance of the loss of an opportunity to get a good grade, depending on which part of the half-full/half-empty glass you are examining (see the second diagram in Figure 4). In short, all effective indirect-acting performance management contingencies designed to increase performance seem to be deadline-induced, rule-governed analogues to avoidance contingencies. Probably the smaller the amount of behavior and the more frequent the deadlines, the easier it is for the person to follow the rule describing that contingency. We find that it works quite well, both from our view and the students', to give quizzes twice a week, with each quiz requiring 2 to 4 hr of study, typically one quiz per chapter.

*The inferred direct-acting contin-*

*gency.* The conceptual problem arises from the long delay between studying and the outcome; the delay is too great for the outcome to reinforce several hours of study, or even a few minutes of study, for that matter. In this case the delay might be from several hours before the opportunity to take the quiz up to several days before the professor returns the graded quiz. The problem is that this performance management contingency is an indirect-acting, rule-governed analogue to an avoidance contingency; it is not a direct-acting avoidance contingency with the temporal parameters of those studied in the basic research laboratory.

So those of us who are uncomfortable with an excessively molar notion of action at a distance infer that behind every effective indirect-acting contingency, with its delayed outcome, lurks a direct-acting contingency, with its immediate outcome. We use essentially the same two-factor theory molecular analysts have used ever since Mowrer (1947, 1960); however, now the burden is even heavier: Not only must we account for the paradox of the nonoccurrence of an event reinforcing the avoidance response, but that nonoccurring event is too delayed to reinforce or punish behavior even if it were an occurring event.

In other words, we say that, like the avoidance contingency, the analogue to the avoidance contingency is also not what reinforces behavior; instead, escape from a learned aversive condition (the warning stimulus) is what reinforces the so-called avoidance response. Reinforcing escape from the learned aversive condition occurs immediately after the so-called avoidance response (really an escape response). In the case of the student, studying reduces the learned aversiveness of approaching the quiz deadline with an empty basket (see the third diagram in Figure 4).<sup>1</sup>

<sup>1</sup> In spite of the fashionableness of the *radical behavioral* label, the methodological majority among us begins to itch violently as soon as we

We have looked at the three components of a behavioral systems approach: goal-directed systems design (with an example from the Education Board), behavioral systems engineering (with an example from the Education Board and the TBA SIG), and the three-contingency model of performance management (with an example from a university course). Now we will apply these three models to various components of a single-faculty-member teaching system.

### THE BEHAVIOR ANALYSIS TRAINING SYSTEM (BATS)

The goal-directed systems design of Figure 2 has an important implication for teachers of behavior analysis: We must be concerned with more than delivering carefully scripted lectures three times a week if we are to have any socially significant impact. We must be even more concerned that we have as large a number of students as possible participating in our education program and that we have as many alumni as possible making effective use of the behavior-analytic skills they acquired under our tutelage. In other words, something like the Education

Board's strategic plan should be the strategic plan for essentially every one of our efforts at teaching behavior analysis, whether those efforts be at the international level of ABA, at the level of the department, or at the level of the individual faculty member. And if the department or even the individual faculty member is not a well-integrated part of such an all-encompassing system, then the department or the faculty member should assume the responsibility for all components of that system. What follows is a description of the efforts of a single faculty member and his students to apply a behavioral systems approach to the development of a local Behavior Analysis Training System (BATS) along the lines of the Education Board's strategic plan for a global behavior analysis training system; even within a sympathetic behavior-analytic department, it can help for individual faculty members to look at their training efforts as a total system. Of course, this may be essential for the lone behavior analyst teaching in a university department.

Like ABA's Education Board, the goal of BATS is to increase the number of behavior analysts who are effectively working toward the well-being of humanity. And like the Education Board, we have three major components—recruitment, training, and job placement (see Figure 1).

#### *The Structure*

BATS functions within, contributes to, and is supported by a behavior-analytically oriented undergraduate program and a set of behavior-analytically oriented graduate programs in psychology, especially the MA and PhD programs in behavior analysis. BATS typically consists of three BA students, nine MA students, three PhD students, and one faculty member. The university and department provide one 10-hr graduate assistantship, four 15-hr work study assistantships, 12 \$500 rat-laboratory assistantships, and a large student office with two computers. In re-

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follow Skinner's (Skinner, 1953, pp. 257–282) radical behavioral lead and treat private events as an important domain of behavior analysis (Malott & Garcia, 1987). And they break out in welts when we follow Skinner's commonsense lead and use everyday terms like *fear* and *anxiety* to provide an easy appreciation of the relevant aversive conditions. As a balm for those welts, methodological behaviorists might briefly practice the gentle art of introspective behaviorism and ask themselves how inappropriate are the labels *fear* and *anxiety* when applied to the aversive condition they find they are immersed in as they rush their ABA conference proposals to the Federal Express office just a few minutes before closing time, the evening before the deadline. (And to counter the advocates of the flower-childish rosy-reinforcement view of the world, they might ask themselves why the embarrassingly large majority of ABA presenters also wait until just before the window closes to grab those putative reinforcers associated with submission of the proposal. Fear, not fun, is the propelling force behind a productive society, which doesn't mean that productivity is not fun.)



turn, BATS' direct annual contribution to the department's training function consists of 18 20-student undergraduate seminar sections distributed across two undergraduate courses (one in a principles of behavior analysis course and the other in the application of those principles), four eight-student behavior analysis practica, three 10-student Graduate Record Examination (GRE) preparation courses, and two 10-student graduate seminars. That is the cake, but not the icing. BATS is also getting increasingly involved in the recruitment and placement functions of our strategic plan, in addition to the training function, as we shall now discuss. We will first look at recruitment, then placement, and finally training.

### *Recruitment*

Although we support the faculty union, unionization does tend to create the illusion that extrinsic reinforcement contingencies kill intrinsic reinforcement contingencies. In other words, the union breeds the value system that we should not teach any more students than we get paid for. But that value system works against the goal of saving the world by training as many excellent behavior analysts as we can. So the philosophy of BATS is to figure out how to move mountains with teaspoons, to figure out how to accomplish as much as we can with our limited resources, and to teach behavior analysis to as many students as we can and hope the union and the administration will not find out and shut us down.

*Textbooks.* We constantly evaluate all features of our courses in terms of their contribution to recruiting as well as their training effectiveness. So we designed two textbooks with the explicit goal of convincing students that the only honorable career choice open to them is a career in the field of behavior analysis. This design entails making the textbooks as readable, clear, and entertaining as possible, with many everyday and applied examples

showing how behavior analysis reliably saves the day when all else fails. In our first text (Malott, Whaley, & Malott, 1993), we mainly demonstrate the power of behavior analysis with little discussion of the shortcomings of alternative positions. By the end of the semester, our students are convinced that behavior analysis is the way to go.

However, we have found that such positive campaigning does little to dissuade the majority of our students from eagerly seeking mentalistic graduate programs. So for our next course, the textbook (Malott, 1995) addresses more directly the shortcomings of mentalism and biological determinism. Yet, we are running the risk of appearing dogmatic and, thus far, seem to have had little effect in stemming the flow to mentalism and biological solutions to behavioral problems. Although a sizable percentage of our qualified graduates do enter graduate programs in behavior analysis, the majority still do not. Note that we do not use our textbooks as screening devices to filter out those not among the cognitive elite. There is room for everybody in behavioral heaven.

*Undergraduate projects.* One of the best recruitment devices we have is the standard cookbook Skinner-box rat laboratory. (In fact, the current editor of the *Journal of Applied Behavior Analysis* attributes to those simple laboratory exercises her switching from aviation science to behavior analysis.) In our opinion, even more effective recruiting devices are projects in which the students use their newly acquired behavioral repertoire in socially significant ways, for example as teaching apprentices in behavioral courses and as behavior modifiers working with clients who have behavior problems.

Within BATS, we support a few undergraduate projects and Honors College theses. These projects and theses involve the application of behavioral systems analysis to the development and evaluation of instructional materials for our principles and applications courses. Our evaluation shows that, al-

though many of the participants enroll in behavior-analytic graduate programs, the majority still do not. So, in the future we will recycle; we plan to involve more students in these projects (10 per semester) and to screen them in terms of their long-range goals in addition to their academic credentials.

*Colloquia, Behavior Analysis Association of Michigan, and ABA.* The majority of our weekly 1.5-hr departmental colloquia are behavior analytic and are attended by faculty, graduate students, and undergraduate students. We hope that at least some of these colloquia inspire as well as inform and will thus function as establishing operations to increase the students' susceptibility to the reinforcer of further training in behavior analysis (i.e., will help to recruit them). So we give 15 optional-activity points to the students in our principles class for attending, and usually about 10 out of 60 attend. In addition, we require attendance at 10 of the 13 semesterly colloquia for students in our applied course.

These optional-activity points may be substituted for the attendance of up to 3 days of class, one quiz, and one homework assignment. However, they may not be used to supplement poor performance (e.g., a low quiz score). The optional-activity points give the students a little more flexibility. In addition, optional-activity points can also contribute toward earning a super A (to be discussed later).

In addition, we actively encourage our undergraduate students to attend behavior analysis conferences. We give 80 optional-activity points for attending the annual conference of the Behavior Analysis Association of Michigan (about 20 undergraduates attended in 1995), and we give 300 optional-activity points to students who attend the annual conference of ABA (about 15 undergraduates attended in 1995, and six received optional-activity points). Among other things, the optional-activity points can count toward an optional one-credit-hour course, Advanced Behavior Analysis. The stu-

dents learn much by attending ABA, but our main objective is to use the conference as an inspirational recruitment device. The theory is that getting drunk with the best behavioral repertoires in our field is a powerful bonding experience that will greatly aid recruitment efforts.

*Behavioral Counseling Service.* Although at least 75% of our students want to go to graduate school, it has become clear that most undergraduate students have little idea about what is appropriate academic preparation for getting into graduate school and what the appropriate steps are, let alone what graduate schools offer programs of interest to them, what graduate programs they might be able to get admitted to, and what jobs are available for graduates with the BA, MA, and PhD degrees. So, as another part of our recruitment of undergraduates into graduate training programs in behavior analysis, our Behavioral Counseling Service was gradually born, illustrating successive cycles through the systems engineering model.

Our Behavioral Counseling Service started in one of our undergraduate psychology courses as a semesterly lecture entitled "Where to Go from Here and How to Get There." But because it was not in print, its reality was too transient. So, the lecture evolved into a 40-page handout, complete with materials from leading behavior analysis graduate programs and leading employers of behavior analysts.

At the end of each lecture, we would invite students to come up after class to make appointments for academic counseling; but only two or three out of 60 students usually did so. So we asked the teaching apprentices to send their top 20 students to us to set up appointments. Most of those top students were eager to do so and were very appreciative of the opportunity, although they had not availed themselves of that opportunity when it had been passively presented. Then we started sending a sign-up sheet throughout the class during the lecture, strong-

ly encouraging but not requiring all the students to sign up; over 90% eagerly did so.

At the same time, we were developing a series of forms (job aids) to help the students figure out what they needed to do to get a 3.0 grade point average, what courses to take and when, and to provide us with information about the students. The students fill out the main form as we lead them through it during the group lecture. It seems like they should need no individual counseling after the lecture in which they fill out the form, but most still do.

Because our Behavioral Counseling System involves 100 30-min counseling sessions per semester, we rationalized that performing behavioral counseling would be a valuable training experience for our teaching apprentices. So now they do most of the counseling under our supervision, after having watched several modeling sessions.

We are developing a database that will allow us to follow up on graduating students, to make sure that they are getting where they want to go. As a result of our first follow-up using this database, we were able to place an excellent student in an excellent behavioral clinical program and thereby rescue her from the depths of depression after her rejection from the clinical programs of several universities whose entrance requirements she had been unable to meet.

An important next step will be to systematically follow up on the counseled students and do performance management to ensure that they do what they want to do and need to do to achieve their professional goals. Then we will truly be a behavioral counseling program.

Our counseling emphasizes behavior analysis programs; but if we have failed to convince a student that behavior analysis is the direction to go, we then do what we can to help the student get into any program he or she wants, no matter how mentalistic and misguided. That way everybody stays

happy. We think our Behavioral Counseling Service is one of the most important contributions of BATS. The students also value it highly.

*GRE preparation course.* An important and overlooked component of recruitment is preparing prospective graduate students so that they are recruitable. Many of our undergraduate students fail to get satisfactory GRE scores, in spite of high grade point averages and top scores in our most rigorous behavior analysis courses. Thus, they often cannot gain admittance to the graduate schools of their choice. Therefore, we offer a GRE preparation course—60 to 140 hr of structured study using standard GRE preparation materials and special fluency-building materials. A literature review indicates that no other GRE preparation program offers such extensive training; therefore, no other program has obtained such impressive results—a mean improvement of 96 points in the combined verbal and quantitative GRE scores (Miller, Goodyear-Orwat, & Malott, 1995). Of course we apply the three-contingency model to the design of the performance management contingencies needed to sustain such extensive and intensive effort on the part of the students.

#### *Job Placement and Performance Maintenance*

Although our Behavioral Counseling Service provides some job placement support, job placement and postgraduate performance maintenance are our weakest links in the sequence of subgoals leading to saving the world. Our MA and PhD students tend to take care of themselves, in that they ultimately get professional jobs, although not always where they will make optimal use of or maintain their behavior-analytic skills. Those most in need of help in getting behavior-analytic jobs are our BA graduates. The jobs are there; it is just a matter of brokering them. At the BA level, part of the problem is performance management. Students in-

tend to get a job in behavior analysis, but somehow they often just drift off into selling used cars.

Probably the biggest problem, however, is our alumni's failure to maintain their behavior-analytic repertoires once they are out in the applied world of expedience. In addition to being more effective in placing our alumni in supportive environments, we have another subgoal—annual demonstrations and upgrading seminars at ABA that might play important maintenance roles.

### *Training*

Our overall training strategy has developed from the convergence of several beliefs:

1. We believe that the lecture has been obsolete since Guttenburg, so we emphasize the textbook as the main source of concepts, illustrations, clarification, and inspiration.

2. We believe that a behavior-analytic view demands or at least suggests something like a learn-unit model of active student responding during classroom instruction (Greer, 1994; Howard, 1994). A learn unit consists of a question, a student response, and feedback. To accommodate this student-centered approach, we avoid the large lecture sections in favor of small seminar sections. But because we teach 18 undergraduate seminar sections per year, with each section consisting of two 2-hr seminars per week, we need a large number of well-trained seminar leaders.

3. We believe that one of the best ways to hone behavior-analytic skills is to teach behavior analysis. Thus, our MA students teach two of these seminar sections during their program as their MA project. In addition they learn training technology, performance management technology (managing the performance of their students), and behavioral systems analysis (treating the training system as a small organization). They learn skills that will be of value to them, whether they go into organizational behavior analysis, human

services organizations, or university teaching. Thus, our undergraduate and graduate students have a symbiotic relationship, with the undergraduates learning from the teaching of the graduate students, and the graduate students learning by teaching the undergraduates.

4. Finally, we believe that few PhD, let alone MA, graduates ever become researchers or even make much use of the research skills they have dallied with during their theses and dissertations, except perhaps for a sort of metaphorical use (Malott, 1992). So, our MA project (teaching two seminar sections and developing the associated instructional materials and technology) is, for most students, a more-than-viable option to the traditional MA thesis.

*The behavioral boot camp.* Running our undergraduate seminars requires considerable fluency with the concepts and principles of behavior analysis, because our seminar leaders present 50 to 100 learn units per hour, many of them arising in class as a result of student-generated examples and questions. The MA students must be able to analyze complex examples correctly and quickly, on their feet, in front of 20 undergraduate students, many of whom may be fairly fluent, and in front of intermittent monitoring of a faculty member who is admittedly sometimes less fluent, but no less critical because of that.

In order to be ready to teach the undergraduate behavior analysis seminars, which start in the fall of each year, our new MA students take two intensive behavior analysis seminars during the summer term, rather than spreading them throughout the year. The two seminars are taught in tandem, typically 3 hr per day, 5 days per week, for 7.5 weeks, requiring a total of about 50 hr of work per week, including out-of-class preparation and in-class participation.

The first seminar deals with the principles of behavior analysis and the second with the applications. They are almost identical to the undergraduate

seminars in both content and structure, with some MA-level supplementation. However, because they are student-centered seminars, the 10 hr of seminar discussion each week are at an MA level rather than at a BA level. In fact, most of the MA students are alumni of the two undergraduate seminars. Typically, by the time they earn their MA degrees, they will have covered the material three times and have achieved an impressive level of fluency.

*The structured seminar.* We find that students cannot achieve conceptual mastery simply by reading textbooks, even the outstanding one we use. In order to be able to discriminate among and generate novel examples and applications of concepts, students must have practice doing so. Therefore, our students typically do a structured 2-hr homework assignment before each class. In the principles seminar, homework often entails use of the single-contingency diagrams like those illustrated earlier in this article. In the applications seminar, homework often entails applications of the diagrams of the three-contingency model.

In the seminar, the students sit in a semicircle, alphabetically by first name. Part of their homework involves multiple-choice discriminations to determine the concepts that are relevant to a particular example. A student will read the example, and the teaching apprentice will then ask all the students to raise their marked response cards (colored index cards) corresponding to the answers they had previously marked in black ink on their homework (Heward, 1994). If there is any disagreement, the students are asked to explain their answers. Sometimes the minority view is correct, and sometimes the majority view is. The students can correct their homework in red ink, during the seminar (their red-ink score determines their homework grade, but their black-ink score is reported in their letters of recommendation). Each assignment also requires each student to diagram an original example of the day's concepts on a trans-

parency. Each student shows his or her transparency on the overhead projector and the class members hold up their green cards (if they think the example is perfect) or their red cards (if they think otherwise). Disagreements are discussed, often with a number of modifications and votes in the process. Students often make transparencies of original examples they are unsure of in order to get feedback from their peers and the teaching apprentice. We all evaluate these structured seminars highly.

### FINAL REMARKS

Obviously we are far from hard data on the long-range and even short-range effectiveness of our applications of behavioral systems analysis to the teaching of behavior analysis. But for BATS, processing system data, social validity data, and our student performance data suggest that we are on the right track, and continuous recycling (or continuous quality improvement, if you prefer) will inch us closer and closer to saving the world with behavior analysis.

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